Claims

What is claimed is:

1. A device comprising:

a collection surface for supporting a spot of immobilized airborne particles, and

at least one detector capable of sensing a biological signature in the spot.

2. The device according to claim 1 wherein the collection surface is a regenerative surface.

3. A device according to claim 2 wherein the detector generates electrical signals, and further comprising a receiver coupled to the detector for receiving the electrical signals.

4. The device according to claim 2 further comprising an inertial impactor for immobilizing the spot of airborne particles on the regenerative collection surface.

5. The device according to claim 2 wherein the detector is selected from the group consisting of a fluorescence detector, Raman spectrometer, a Fourier transform infrared spectrometer, and a MALDI mass spectrometer

6. The device according to claim 5 wherein the detector is a fluorescence detector capable of emitting excitatory radiation of wavelengths operative to excite biomolecules.

7. The device according to claim 1 wherein the biological signature is selected from the group consisting of autofluorescence, Raman spectrum, infrared absorption spectrum, and mass spectrum.

8. A device comprising:

a regenerative collection surface for supporting a spot of immobilized airborne particles,

an excitation light source for emitting excitatory radiation towards the spot, the excitatory radiation having a wavelength operative to excite biomolecules to produce fluorescence, and

a fluorescence photosensor for measuring fluorescence radiation emitted from the spot.

9. The device according to claim 8 wherein the excitatory radiation is substantially ultraviolet, and the fluorescence radiation is substantially visible

10. The device according to claim 8 wherein the excitation light source is a LED.

11. The device according to claim 10 wherein the wavelength operative to excite biomolecules is within a 340-370 nm range.

12. The device according to claim 8 wherein the wavelength operative to excite biomolecules is of approximately 266 nm.

13. The device according to claim 8 wherein the wavelength operative to excite biomolecules is of approximately 400 nm.

14. The device according to claim 8 wherein the fluorescence photosensor is a photodiode.

15. The device according to claim 8 further comprising a dichroic mirror that substantially reflects excitatory radiation and is substantially transparent to fluorescence radiation, the dichroic mirror being positioned to reflect the excitatory radiation towards the spot.

16. The device according to claim 15 further comprising at least one of an excitation filter positioned between the excitation light source and the dichroic mirror, and an emission filter positioned between the dichroic mirror and the fluorescence photosensor.

17. A device comprising:

a detector capable of sensing a biological signature in a spot of airborne particles immobilized on a collection surface, the detector producing signals indicative of the biological signature,

a processor coupled to the detector to receive the signals, the processor being capable to process the signals to establish a concentration of biological particles in the spot, and the processor being capable to output an alarm signal when it establishes that the concentration of

biological particles in the spot exceeds a predetermined value.

18. The device according to claim 17 wherein the collection surface is a regenerative collection surface.

19. The device according to claim 17 wherein the detector is a fluorescence detector.

20. The device according to claim 17 wherein the processor is a Neuron Chip®.

21. A method of detecting airborne biological particles, the method comprising:

depositing airborne particles on a regenerative collection surface to form a spot,

measuring a biological signature present in the spot,

determining a concentration of airborne biological particles from the measurement, and

regenerating the collection surface.

22. The method according to claim 21 wherein depositing is by inertial impaction.

23. The method according to claim 21 wherein the biological signature is autofluorescence.

24. The method according to claim 21 wherein the biological signature is selected from the group consisting of autofluorescence, Raman spectrum, infrared absorption spectrum, and mass spectrum.

25. A method of continuous monitoring of airborne biological particles, the method comprising a plurality of cycles, each cycle comprising:

depositing airborne particles on a regenerative collection surface to form a spot,

measuring autofluorescence of biomolecules in the spot,

determining a present value of a concentration of airborne biological particles from the measurement, and

regenerating the collection surface.

26. The method according to claim 25 further comprising

calculating an average value and a standard deviation from a defined number of prior present values obtained in the defined number of preceding cycles,

comparing the present value to the average value, and

outputting an alarm signal if the present value exceeds the average value plus a preset factor multiplied by the standard deviation.

27. The method according to claim 26 wherein the defined number is eight.

28. The method according to claim 26 wherein the preset factor is between about 3 and 5.